Research Skills

Advanced MSc and PhD Students

http://www.cs.bham.ac.uk/~jxb/rs.html

Lecture 3
Literature Searching & Review

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A rapidly changing scenario - I

Searching the literature: **techniques and methods in rapid progress and mutation**

- Paper catalogues
- Electronic catalogues
- World Wide Web & Internet (1990s)
- Google (2000s - now)
- . . . . what's next?

A rapidly changing scenario - II

From paper catalogues to recent search algorithms (i.e. google) the **change** is not limited to the support (electronic vs. paper) but expands to the **overall approach of retrieving information**

- Metadata
- Ranking and statistical analysis
- Personalised searches
- Automated suggestions
-  RSS

A rapidly changing scenario - III

• **2006-2008** : Conference **paper proceedings are being abandoned** in favour of electronic versions only

This is also caused by higher quality screens that allow for more comfortable reading

• New paper-like screens, e-book readers and annotation tools are rapidly improving in quality and gaining visibility on the market

➡ All new scientific material (not only titles or abstract) is available to search algorithms and easily retrievable **BUT** old papers and books might not be in electronic format

Searching Case I (easy)
we know what we are looking for

- One's supervisor tells the student to go to the library and read books on Machine Learning/Neural Networks/ Robotics (check http://library.bham.ac.uk for books, loans, interlibrary loan)

- The journal *ABC* contains good papers on one's topic, one goes online or to the library and reads some papers from recent years

- One has paper A that cites papers B1, B2, B3 and he is interested retrieving and reading papers B1, B2, B3.

Searching Case II (difficult)
we **don't** know what we are looking for

- One has topics, keywords, ideas and performs a wide search on many catalogues, search engines
(could be frustrating when nothing can be found)

- One comes from a different field and would like to find more on **interdisciplinary areas**
(for instance scientists with background in biology working in Computer Science and vice versa)

- One is curious about some field and would like to expand his knowledge or ascertain ideas or intuitions

Search engines

- List of search engines at:
http://www.cs.bham.ac.uk/~aqs/RS/search.html

- Use of operators, wild-cards :
READ SEARCH TIPS!
  - i.e. ACM search tips (http://portal.acm.org/search_help.cfm)
  - google scholar search tips (http://scholar.google.com/intl/en/scholar/refinesearch.html)

- Read how to perform **ADVANCED SEARCHES**

Using keywords

- To retrieve papers, but also to find departments, people
- Read papers, find new keywords, repeat search
- Example of different terminology related to close concepts
  - Genotype-phenotype (indirect) mapping
  - L-systems
  - Developmental Systems
  - Artificial Ontogeny
  - Computational Embryogeny
  - Cellular Encoding
  - Morphogenesis
  - Artificial Embryogeny

Finding the work done for you: review papers

- Often review papers save us plenty of time because **contain references** to a **large number of related works**

- Present a field and list its sub-fields in a **logical organised manner**

- Capture and present us the **main messages** of cited papers in a **concise and clear way**

Tracking citations forward in time

It could be interesting to find who is citing a certain paper and discover more recent developments in the field

- Google scholar
- ISI Web of Knowledge
- . . .

However, the method is not accurate and results can be incomplete or wrong

Access to resources

Universities usually are subscribed to electronic resources and journal archives

- Make sure you authenticate at http://athens.bham.ac.uk
- If not on campus, establish tunnelling via VPN
- If the resource is not available, search the web or the authors' web page
- If all attempts fail, email the authors

Extra - not only computers: literature search by social means

• From **idea** to paper publication and date of **availability on electronic databases** there could be a **1-3 year delay**

➡ To be really up-to-date, informal talks and social connections with researchers in the field are the best way

• Have a ready, short description of your research interests for informal talks with colleagues and listen to other people

➡ Social networks can be useful for literature search and help being aware of other people work